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EXAMINER
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

PTOL-90A (Rev. 04/07)

	Application No.	Applicant(s)
Office Action Summary	10/591,719	GARMONOV ET AL.
	Examiner	Art Unit
	FRANK DONADO	2617

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *05 September 2006*.
2a)☐ This action is **FINAL**.   2b)☒ This action is non-final.
3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-22* is/are pending in the application.
　　4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5)☐ Claim(s) _____ is/are allowed.
6)☒ Claim(s) *1-22* is/are rejected.
7)☐ Claim(s) _____ is/are objected to.
8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.
10)☒ The drawing(s) filed on *05 September 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.
　　Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
　　Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
　　a)☒ All　b)☐ Some * c)☐ None of:
　　　1.☐ Certified copies of the priority documents have been received.
　　　2.☐ Certified copies of the priority documents have been received in Application No. _____.
　　　3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
　　* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *12/18/06*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Specification

1.   Applicant is reminded of the proper language and format for an abstract of the disclosure.

The abstract should be in narrative form and generally limited to a **single paragraph** on a separate sheet within the range of 50 to 150 words.

2.   The abstract of the disclosure is objected to for the following reasons:

a) The abstract is 2 paragraphs in length.

b) The 2nd paragraph should be changed from "...pilot signals for transmit diversity, transmitted from each adaptive antenna array in each efficient transmission direction, combining ..." to "...estimating impulse responses from pilot signals that are transmitted from each adaptive antenna array in each efficient transmission direction for transmit diversity, combining ..."

Correction is required. See MPEP § 608.01(b).

Claim Rejections - 35 USC § 112

3.   The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4.   Claims 1-22 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for

failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding claims 1, 10, 11, 17 and 18, the variable Lsub m is defined as the "weighting coefficients of transmission direction" in lines 6 and 7 of Claim 1. The variable K is defined as the number of transmission channels in line 2 of claim 1. Since the examiner interprets the variable Lsub m and K as defined above, examiner requests for the phrase "...Lsub m channels of directional transmission...", as stated in line 17 of claim 1, to be changed to "...K channels of directional transmission..." in claim 1 and in claims 10, 11, 17 and 18, where appropriate. Also, regarding claim 1 only, claims are narrative in form and replete with indefinite **("such that")** and functional or operational language. The structure which goes to make up the device must be clearly and positively specified. The structure must be organized and correlated in such a manner as to present a complete operative device. The claims must be in one sentence form only. Note the format of the claims in the patent **US 6,792,290**.

Claims 4-5 and 12 recite the limitation "The method of data transmission". There is insufficient antecedent basis for this limitation in the claim. In addition, the variable Lsub m is defined as the "weighting coefficients of transmission direction" in lines 6 and 7 of Claim 1. The variable K is defined as the number of transmission channels in line 2 of claim 1. Since the examiner interprets the variable Lsub m and K as defined above, examiner requests for the phrase "...K channels of directional transmission...", as stated in line 17 of claim 1, to be changed to "...K channels of directional transmission...", where appropriate. Also, the claims are narrative in form and replete with indefinite **("such that")** and functional or operational language. The structure which goes to make up the device must be clearly and positively

specified. The structure must be organized and correlated in such a manner as to present a complete operative device. The claims must be in one sentence form only. Note the format of the claims in the patent **US 6,792,290**.

Claims 19-21 recite the limitation "The apparatus for data transmission". There is insufficient antecedent basis for this limitation in the claim.

Claim 22 recites the limitation "The apparatus of claim 17". There is insufficient antecedent basis for this limitation in the claim. Claim 22 also recites "...the block of directional transmission...". There is insufficient antecedent basis for this limitation in the claim. Since this limitation exists in claims 19, 20 and 21, the examiner has interpreted this claim to depend on independent claims 19, 20 or 21 and has examined this claim accordingly (See below).

Claims 2, 3, 6-9, and 13-16 are also rejected by virtue of their dependency on claims 1 and 10.

Claim Rejections - 35 USC § 102

5.   The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless --
>
> (e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

6.   Claims 1-7 and 10-18 are rejected under 35 U.S.C. 102(e) as being anticipated by Vialle, et al (**US PG Publication 2005/0117660**). From now on, Vialle, et al, will be referred to as Vialle.

Regarding claims 1 and 4-5 Vialle teaches a method of data transmission, such that M diverse groups of transmission channels each having K transmission channels, where $M \geq 1$, $K \geq 1$, are formed at the base station (**A wireless communications network has channel diversity wherein transmissions take place between a base station and a mobile station, wherein many groups of transmission channels, each group having many channels, exist, Paragraph 21, lines 1-3 and Paragraph 22, lines 1-10**), pilot signals are transmitted from the base station to the mobile station from all M. K transmission channels of diverse groups (**Paragraph 31, lines 1-2**), impulse responses of M. K transmission channels of diverse groups are estimated at the mobile station using the transmitted pilot signals (**Pilot symbols undergo a Filtered Impulse Response (FIR) filter, Paragraph 31, lines 2-4**), which differs in that Lm sets of weighting coefficients of transmission direction each having K - 1 weighting coefficients of transmission direction are formed at the mobile station (**The number of weighting coefficients per FIR Filter is set equal to the number of channels, so using the variables Lsub m and K, Lsub m = 1 and K = 1, Paragraph 44, lines 2-5**) using the estimated impulse responses of M. K transmission channels of diverse groups (**Weighting coefficients are formed from the FIR filter, the Finite Impulse Response, for each antenna in the array, Paragraph 26, lines 1-7**), where $1 <= Lm <= K$ and $m = 1, 2 \ldots M$, for each of M diverse groups of transmission channels for each of Lm sets of weighting coefficients of transmission direction a transfer function of a channel of directional transmission corresponding to this set is estimated at the mobile station

(**Transfer functions are estimated at the receiver for each channel, Paragraph 26, lines 7-10**), a feedback signal containing Lm weighting coefficients of transmission direction formed for each of M diverse groups of transmission channels as well as an estimated transfer function for each of Lm weighting coefficients of transmission direction formed for each of M diverse groups of transmission channels is transmitted from the mobile station to the base station (**The weighting coefficients of transmission direction are formed from the transfer function derived from the feedback signal received from the mobile station by the base station, Paragraph 26, lines 1-10 and Paragraph 30, lines 19-21**), K channels of directional transmission are formed at the base station for each of M diverse groups of transmission channels using the transmitted sets of weighting coefficients of transmission direction (**The weighting coefficients help to form the copies to be transmitted to the receiver for each channel, Paragraph 27. Lines 1-7**), channels of signal spectrum correction are formed at the base station for each of M diverse groups of transmission channels for each of K channels of directional transmission (**Power is one of the weighting characteristics used for correction of the transmission signal, and since this characteristic is re-defined for each channel at the base station, the signal spectrum is corrected, a codebook (look-up table) being used in this case to adjust the method of transmission to use the maximum power, Paragraph 33, lines 4-6 and 8-12**) and their transfer functions are corrected according to the transmitted estimated transfer functions of channels of directional transmission in such a way that the reception quality of an information signal at the mobile station is maximized (**Transfer functions are estimated at the receiver for each channel, and a Hermitian transformation, which is a type of Fourier transformation, takes place on the impulse response obtained from the Filtered**

Impulse Response Filter to achieve maximum power and obtain the desired transfer functions, Paragraph 26, lines 7-10 and Paragraphs 34-38), information signal copies are formed at the base station for all K channels of directional transmission for all M diverse groups of transmission channels and all formed copies of the information signal are simultaneously transmitted over the corresponding channels of directional transmission after applying them to the respective channels of signal spectrum correction **(A copy of the "correct" signal, a signal with the needed transmission characteristics for maximum output, is produced from the above process, Column 27, lines 1-7).**

Regarding claim 2, Vialle teaches the method of claim 1, wherein all transmitted pilot signals and the information signal are mutually orthogonal or quasi-orthogonal **(The system is adaptable to be used in a Orthogonal Frequency Division Multiplexing method Paragraph 11, lines 4-8 and Paragraph 12, lines 4-6. Since the pilot signal and corrected information signal are exclusive but interference of these signals may take place, due to multipath fading, these 2 signals are quasi-orthogonal to one another, Paragraph 27, lines 1-10 and Paragraph 31, lines 1-4).**

Regarding claims 3 and 7, Vialle teaches the method of claim 1, wherein all transmitted pilot signals, pilot signals for transmit diversity and the information signal are quasi-orthogonal **(Transmit diversity takes place, and since the pilot signal and corrected information signal are exclusive but interference of these signals may take place, due to multipath fading, these 2 signals are quasi-orthogonal to one another, Paragraph 27, lines 1-10, Paragraph 31, lines 1-4 and 10-14, Paragraph 23, lines 3-7).**

Regarding claim 6, Vialle teaches the method of claim 3, wherein all transmitted pilot

signals, pilot signals for transmit diversity, and the information signal are mutually orthogonal

(The system is adaptable to be used in a Orthogonal Frequency Division Multiplexing

method Paragraph 11, lines 4-8 and Paragraph 12, lines 4-6. Transmit diversity takes

place, the pilot signal and corrected information signal are exclusive of one another, and

when no interference of these signals takes place, these 2 signals are orthogonal to one

another, Paragraph 27, lines 1-10, and Paragraph 31, lines 1-4 and 10-14).

Regarding claim 10, Vialle teaches the method of claim 1, wherein K channels of

directional transmission are formed at the base station for each of M diverse groups of

transmission channels using the transmitted sets of weighting coefficients of transmission

direction in such a way that in each of K channels of directional transmission K copies of an

input signal of this channel of directional transmission are formed and transmitted over the

corresponding transmission channel of this diverse group of transmission channels once each

copy, starting from the second one, has been multiplied by the corresponding weighting

coefficient of transmission direction of the respective set of weighting coefficients of

transmission direction **(Correct copies of transmit signals, corresponding to each**

transmission channel, are transmitted once each copy has been formed from the set of FIR

filters through mathematical formulas that include the multiplication of weighting

coefficients by other factors for each of their corresponding channels, where "w" is the

weighting coefficient that gets multiplied, wherein the series of multiplications would

include all channels starting from the second one, Paragraph 27, lines 1-7 and Paragraph

33, lines 8-12).

Regarding claim 11, Vialle teaches the method of claim 4, wherein for each of M diverse

groups of transmission channels an estimate of a transfer function of each of K channels of

directional transmission, obtained using K pilot signals transmitted from this diverse group of

transmission channels, is combined with an estimate of its transfer function, obtained using a

pilot signal for transmit diversity transmitted from this diverse group of transmission channels, in

such a way that these two estimates are averaged with weights that are inversely proportional to

error metrics of these estimates (**A weighting coefficient, Signal-to-Noise Ratio, vs. Bit Error

Rate is graphed in Figure 5, where their corresponding coordinate values are inversely

proportional to each other**).

Regarding claim 12, Vialle teaches a method of data transmission, such that

M diverse groups of transmission channels each having K transmission channels are formed at

the base station (**A wireless communications network has channel diversity wherein

transmissions take place between a base station and a mobile station, wherein many groups

of transmission channels, each group having many channels, exist, Paragraph 21, lines 1-3

and Paragraph 22, lines 1-10**), where M $\geq$ 1, K $\geq$ 1, which differs in that M diverse groups of

receiving channels each having K receiving channels corresponding to M formed diverse groups

of transmission channels are formed at the base station, a signal is transmitted from the mobile

station to the base station and received at the base station in each of K receiving channels of each

of M diverse groups (**A wireless communications network has channel diversity wherein

signal receptions take place between a base station and a mobile station, Paragraph 21,

lines 1-3 and Paragraph 22, lines 1-10**), Lsub m sets of weighting coefficients of transmission

direction each having K coefficients are formed for each of M diverse groups of transmission

channels using a signal received from the mobile station in such a way that the reception quality

of the base station signal received at the mobile station is maximized, where Lm >_ 0 and m = 1,

2,..., M (**A plurality of weighting coefficients of transmission direction are produced using**

the pilot signals that are filtered through a Finite Impulse Response Filter, wherein

optimization occurs because of the weighting coefficients, Paragraph 31, lines 1-4,

Paragraph 27, lines 1-7, Paragraph 45, lines 6-8 and Fig. 5, where the Bit Error Rate is

lower the more weights are used), K channels of directional transmission are formed at each of

M diverse groups of transmission channels using formed sets of weighting coefficients of

transmission direction (**Paragraph 27, lines 1-7**), pilot signals for transmit diversity are

transmitted to the mobile station from each of M diverse groups of transmission channels over

each of K channels of directional transmission (**Paragraph 31, lines 1-2 and 10-14**), transfer

functions of all K channels of directional transmission are estimated at the mobile station for

each of M diverse groups of transmission channels using the transmitted pilot signals for transmit

diversity (**Pilot signals contribute to the impulse responses through the FIR Filter, Finite**

Impulse Response, that contribute to the transfer function used to form the weighting

coefficients of transmission direction, Paragraph 31, lines 1-4 and Paragraph 26, lines 1-

10), a feedback signal containing Lsub m estimated transfer functions of directional transmission

channels for each of M diverse groups of transmission channels is transmitted to the base station

(**The weighting coefficients of transmission direction are formed from the transfer function**

derived from the feedback signal received from the mobile station by the base station,

Paragraph 26, lines 1-10 and Paragraph 30, lines 19-21), channels of signal spectrum

correction are formed at the base station for each of M diverse groups of transmission channels

for each of K channels of directional transmission and their transfer functions are corrected

according to the transmitted estimated transfer functions of directional transmission channels in

such a way that the reception quality of the information signal at the mobile station is maximized

(Power is one of the weighting characteristics used for correction of the transmission signal,

and since this characteristic is re-defined for each channel at the base station, the signal

spectrum is corrected, a codebook (look-up table) being used in this case to adjust the

method of transmission to use the maximum power, Paragraph 33, lines 4-6 and 8-12),

information signal copies are formed for all K channels of directional transmission for all M

diverse groups of transmission channels and all formed copies of the information signal are

simultaneously transmitted over the corresponding channels of directional transmission after

applying them to the respective channels of signal spectrum correction **(A copy of the "correct"**

signal, a signal with the needed transmission characteristics for maximum output, is

produced from the above process, Column 27, lines 1-7).

Regarding claim 13, Vialle teaches the method of claim 10, wherein a signal transmitted

from the mobile station to the base station is a pilot signal, or an information signal, or a

feedback signal, or a control signal, or any combination of these signals **(A feedback signal is**

transmitted back from the mobile to the base station, Paragraph 30, lines 19-21).

Regarding claim 14, Vialle teaches the method of claim 10, wherein L_m sets of weighting

coefficients of transmission direction each having K coefficients are formed for each of M

diverse groups of transmission channels in such a way that directions of arrival and the

corresponding receiving powers of the received signal are estimated for each of M diverse

groups of receiving channels **(Sets of weighting coefficients that can be set equal to the**

number of channels are formed for all transmission groups, the phase of the signal is
adjusted accordingly to meet antenna diversity, and the corresponding received powers are
estimated for each receive antenna to achieve maximum power in a transmission method
that includes Quadrature Phase Shift Keying, Paragraph 44, lines 1-5, Paragraph 29, lines
1-8, Paragraph 30, lines 1-7 and 14-21, Paragraph 32, lines 17-23 and 26-28 and Figs. 3 and
4), Lsub m directions corresponding to L$_{sub\ m}$ maximum average values of received signal power
are selected for each of M diverse groups of receiving channels (The method of transmission is
weighted to transmit the maximum power, Paragraph 33, lines 8-12), Lsub m sets of
weighting coefficients of transmission direction each having K coefficients of transmission
direction are formed for each of M diverse groups of transmission channels in Lm directions of
signal arrival selected for a corresponding diverse group of reception channels in such a way that
the reception quality of the signal transmitted from the base station to the mobile station is
maximized (Sets of weighting coefficients that can be set equal to the number of channels
are formed for all transmission groups, the phase of the signal is adjusted accordingly to
meet antenna diversity, the corresponding received powers are estimated for each receive
antenna to achieve maximum power in a transmission method that includes Quadrature
Phase Shift Keying, and the method of transmission is weighted to transmit the maximum
power, Paragraph 44, lines 1-5, Paragraph 29, lines 1-8, Paragraph 30, lines 1-7 and 14-21,
Paragraph 32, lines 17-23 and 26-28, Paragraph 33, lines 8-12 and Figs. 3 and 4).

Regarding claim 15, Vialle teaches the method of claim 10, wherein channels of
directional transmission are formed in such a way that in each channel of directional
transmission K copies of an input signal of this channel of directional transmission are formed

and transmitted over a corresponding transmission channel once each copy of the input signal

has been multiplied by the corresponding weighting coefficient of transmission direction of the

respective set of weighting coefficients of transmission direction (**Correct copies of transmit**

signals, corresponding to each transmission channel, are transmitted once each copy has

been formed from the set of FIR filters through mathematical formulas that include the

multiplication of weighting coefficients by other factors for each of their corresponding

channels, where "w" is the weighting coefficient that gets multiplied, Paragraph 27, lines 1-

7 and Paragraph 33, lines 8-12).

Regarding claim 16, Vialle teaches the method of claim 10, wherein all transmitted pilot

signals for directional transmission and the information signal are mutually orthogonal or quasi-

orthogonal (**The system is adaptable to be used in a Orthogonal Frequency Division**

Multiplexing method Paragraph 11, lines 4-8 and Paragraph 12, lines 4-6. Since the pilot

signal and corrected information signal are exclusive but interference of these signals may

take place, due to multipath fading, these 2 signals are quasi-orthogonal to one another,

Paragraph 27, lines 1-10 and Paragraph 31, lines 1-4).

Regarding claim 17, Vialle teaches the method of claim 3, wherein transfer functions of

all K channels of directional transmission are estimated at the mobile station for each of M

diverse groups of transmission channels using the transmitted pilot signals for transmit diversity

in such a way that an estimate of transfer function of each channel of directional transmission is

equal to Fourier transform of estimated impulse response of this channel of directional

transmission (**Transfer functions are estimated at the receiver for each channel using pilot**

signals in a transmission method that includes transmit diversity, and a Hermitian

transformation, which is a type of Fourier transformation, takes place on the impulse

response obtained from the Filtered Impulse Response Filter to achieve maximum power,

Paragraph 26, lines 7-10, Paragraph 31, lines 1-4 and 10-14 and Paragraphs 34-38).

Regarding claim 18, Vialle teaches the method of claim 1, wherein channels of signal

spectrum correction are formed at the base station for each of M diverse groups of transmission

channels for each of K channels of directional transmission in such a way that a transfer function

of each channel of signal spectrum correction is equal to a complex conjugate of the

corresponding estimated transfer function of the channel of directional transmission (Power is

one of the weighting characteristics used for correction of the transmission signal, and since

this characteristic is re-defined for each channel at the base station, the signal spectrum is

corrected, a codebook (look-up table) being used in this case to adjust the method of

transmission to use the maximum power, and complex weighting coefficients are derived

from the transfer function in the transmission method, Paragraph 33, lines 4-6 and 8-12

and Paragraph 23, lines 3-7).

Allowable Subject Matter

7.   Claims 8 and 9 would be allowable if rewritten to overcome the rejection(s) under 35

U.S.C. 112, 2nd paragraph, set forth in this Office action and to include all of the limitations of

the base claim and any intervening claims.

8.   The following is a statement of reasons for the indication of allowable subject matter:

Regarding claim 8, Vialle teaches the limitations of claim 1. In the opinion of the examiner, all other prior art fails to teach Lm sets of weighting coefficients of transmission direction each having K- 1 weighting coefficients of transmission direction are formed at the mobile station for each of M diverse groups of transmission channels using the estimated impulse responses of M. K transmission channels of diverse groups in such a way that a spatial correlation matrix Rsub m,n is formed for each of M diverse groups of transmission channels for all of N resolvable paths of the transmitted pilot signals, where N _> 1, as follows:

$$R \char`\^ m, n = [h m, 1, n h m, 2, n h m$$

$$, K, n] [(h m, 1, n)*(h m, 2, n)*(h m, K, n)*]$$

where hsub m,k,n is a coefficient of the estimated impulse response of transmission channel k of diverse group m corresponding to the resolvable path n of the transmitted pilot signals, m = 1,2,...,M, k = 1,2 ....K, n = 1,2,...,N, x" is an operation of complex conjugation of x, the spatial correlation matrix Rsub m of all resolvable paths is formed for each of M diverse groups of transmission channels as follows:

The spatial correlation matrix Rsub m = *Summation of from 1 to N of the spatial correlation matrices Rsub m, n*, an averaged spatial correlation matrix Rsub m (i), where i _> 1 is the number of an averaging step, is formed for each of M diverse groups of transmission channels as follows:

The matrix Rsub m(i) = The matrix Rsub m for i = 1;

Alpha x The matrix Rsub m(i-1) + (1-alpha) x Rsub m for i>1;

where 0 <= alpha <= 1 is an averaging coefficient, the averaged spatial correlation matrix Rsub

m(i) is decomposed into eigen values Thetasub m, k and corresponding eigen vectors Vsub m, k, where k = 1, 2 .....K, the maximum eigen value Thetasub m/max is selected among eigen values Thetasub m, k , such eigen values Thetasub m, j are selected among all eigen values that *Thetasub m, j >= (Beta x Thetasub m/max), where 0 <= Beta <= 1, j = 1,2,....Lsub m*. Lsub m is equal to the number of eigen values Thetasub m, j for which this condition is satisfied, Lsub m eigen vectors Vsub m, j corresponding to Lsub m selected eigen values Thetasub m, j are selected, Lsub m sets of weighting coefficients of transmission direction each having K- 1 weighting coefficients of transmission direction are formed as follows:

Wsub m, j, k = ((Vsub m, j ,k)/(Vsub m, j, 1)), where Wsub m, j, k is the k -th transmission direction weighting coefficient of the j-th set of transmission direction weighting coefficients of the m-th diverse group of transmission channels, Vsub m, j, k is the k-th element of the j-th eigen vector of the averaged spatial correlation matrix of the m –th diverse group of transmission channels, m = 1,2, ...M, j = 1,2,...Lsub m, k = 2,3,....K.

　　　Regarding claim 9, Vialle teaches the method of claim 1. In the opinion of the examiner, all other prior art fails to teach transfer functions of channels of directional transmission corresponding to each of Lm sets of weighting coefficients of transmission direction of all M diverse groups of transmission channels are estimated at the mobile station in such a way that an impulse response of each channel of directional transmission is formed as follows:

　Hsub m, j =

Summation of from 1 to K of (Wsub m, j, k x hsub m, k), Wsub m, j, 1 .ident. 1,

where Wsub m, j, k is the k -th transmission direction weighting coefficient of the j -th set of

transmission direction weighting coefficients of the m -th diverse group of transmission

channels, m = 1,2,...M, j = 1,2 .....Lm, k = 1,2 ...K , hsub m, k = *Summation of from 1 to N of*

(hsub m, k, n x ∂(1-tsub n) is an impulse response of the k-th transmission channel of the m -th

diverse group of transmission channels, where hsub m, k, n is a coefficient of the estimated

impulse response of the k-th transmission channel of the m-th diverse group of transmission

channels corresponding to the n-th resolvable path of transmitted pilot signals, tsub n is a delay

of the n-th resolvable path of transmitted pilot signals, m = 1,2,...M, k = 1,2,...K, n = 1,.2, ...N,

an estimate of a transfer function of this channel of directional transmission is equal to the

Fourier transform of the formed impulse response Hsub m, j of this channel of directional

transmission.

9.   Claims 19-22 would be allowable if rewritten or amended to overcome the rejection(s)

under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action.

10.   The following is a statement of reasons for the indication of allowable subject matter:

        Regarding claim 19, in the opinion of the examiner, all other prior art fails to teach an

apparatus for data transmission that includes M blocks of directional transmission, M. K

summation blocks, M. K analog transmitters, M. K antenna elements, such that the second inputs

of each of M blocks of directional transmission are inputs of the corresponding weighting

coefficients of transmission direction, each of K outputs of each of M blocks of directional

transmission is connected to the second input of the corresponding block of summation, the first

input of each of M. K blocks of summation is an input of the corresponding pilot signal, outputs

of blocks of summation are connected to inputs of the corresponding analog transmitters, their

outputs are connected to inputs of the corresponding antenna elements, their outputs are outputs

of the apparatus for data M transmission, which differs in that another *summation of from 1 to*

M for Lsub m -1 blocks of directional transmission and *summation from 1 to M for Lsub m*

blocks of signal spectrum correction are added, where the first input of each of *summation from*

1 to M for Lsub m blocks of signal spectrum correction is an input of the information signal, the

second input of each of *summation from 1 to M for Lsub m* blocks of signal spectrum correction

is an input of the corresponding transfer function of the channel of directional transmission, an

output of each of *summation from 1 to M for Lsub m* blocks of signal spectrum correction is

connected to the first input of the corresponding block of directional transmission, each

of K outputs of each of *summation from 1 to M for Lsub m* - 1 additional blocks of directional

transmission is connected to *(Lsub m -1)* additional second inputs of the corresponding block of

summation, where m takes on the values from 1 to M.

Regarding claim 20, in the opinion of the examiner, all other prior art fails to teach an

apparatus for data transmission that includes M blocks of directional transmission, M.K blocks

of summation, M.K analog transmitters, M. K antenna elements, such that the second inputs of

each of M blocks of directional transmission are inputs of the corresponding weighting

coefficients of transmission direction, each of K outputs of each of M blocks of directional

transmission is connected to the second input of the corresponding block of summation, the first

input of each of M. K blocks of summation is an input of the corresponding pilot signal, outputs

of blocks of summation are connected to inputs of the corresponding analog transmitters, the

outputs of which are connected to the inputs of the corresponding antenna elements, whose

outputs are outputs of the apparatus for data transmission, which differs in that *summation of*

from 1 to M for Lsub m -1 additional blocks of directional transmission, *summation of from 1*

to M for Lsub m blocks of signal spectrum correction, and *summation of from 1 to M for Lsub*

m summators are added, where the first input of each of *summation of from 1 to M for Lsub m*

blocks of signal spectrum correction is an input of the information signal, the second input of

each of *summation of from 1 to M for Lsub m* blocks of signal spectrum correction is an input

of the corresponding transfer function of the channel of directional transmission, an output of

each of *summation of from 1 to M for Lsub m* blocks of signal spectrum correction is connected

to the first input of the corresponding summator, the second input of each of *summation of from*

1 to M for Lsub m summators is an input of the corresponding pilot signal for transmit diversity,

an output of each of *summation of from 1 to M for Lsub m* summators is connected to the first

input of the corresponding block of directional transmission, each of K outputs of each of

summation of from 1 to M for Lsub m -1 additional blocks of directional transmission is

connected to *summation of from 1 to M for Lsub m -1* additional second inputs of the

corresponding block of summation, where m takes on the values from 1 to M.

Regarding claim 21, in the opinion of the examiner, all other prior art fails to teach an

apparatus for data transmission that includes M blocks of directional transmission, M. K blocks

of summation, M. K analog transmitters, M. K antenna elements, such that outputs of each of M

blocks of directional transmission are connected to inputs of the corresponding blocks of

summation, an output of each of M. K blocks of summation is connected to an input of the

corresponding analog transmitter, an output of each of M. K analog transmitters is connected to

the first input of the corresponding antenna element, the first output of each of M.K antenna

elements is an output of the apparatus for data transmission, which differs in that *summation of*

from 1 to M for Lsub m -1 additional blocks of directional transmission, *summation of from 1*

to M for Lsub m blocks of signal spectrum correction, *summation of from 1 to M for Lsub m*

summators, M. K analog receivers, and M weighting coefficients of transmission direction

forming blocks are added, where the first input of each of *summation of from 1 to M for Lsub m*

blocks of signal spectrum correction is an input of the information signal, the second input of

each of *summation of from 1 to M for Lsub m* blocks of signal spectrum correction is an. input

of the corresponding transfer function of channel of directional transmission, an output of each

of *summation of from 1 to M for Lsub m* blocks of signal spectrum correction is connected to

the first input of the corresponding summator, the second input of each of *summation of from 1*

to M for Lsub m summators is an input of the corresponding pilot signal for transmit diversity,

an output of each of *summation of from 1 to M for Lsub m* summators is connected to the first

input of the corresponding block of directional transmission, K second inputs of each of

summation of from 1 to M for Lsub m blocks of directional transmission are connected to K

corresponding outputs of the respective weighting coefficients of transmission direction forming

block, outputs of each of *summation of from 1 to M for Lsub m -1* additional blocks of

directional transmission are connected to additional inputs of the corresponding blocks of

summation, the second input of each of M.K antenna elements in an input of the receiving signal,

the second output of each of M. K antenna elements is connected to an input of the

corresponding analog receiver, an output of each of M. K analog receivers is connected to the

corresponding input of the respective weighting coefficients of transmission direction forming blocks.

Regarding claim 22, in the opinion of the examiner, all other prior art fails to teach the apparatus of claim 19, 20 or 21, wherein the block of directional transmission consists of K multipliers, where combined first inputs of K multipliers are the first input of block of directional transmission, their second inputs are the second inputs of block of directional transmission, and their outputs are outputs of the block of directional transmission.

Conclusion

11.   The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

US Patent No. 5,539,832 refers to a multi-channel signal separation using cross-polyspectra.

US PG Publication 2003/0036359 refers to a mobile station loop-back signal processing.

US PG Publication 2003/0020651 refers to a wireless packet switched communication systems and networks using adaptively steered antenna arrays.

US Patent No. 6,907,270 refers to a method and apparatus for reduced rank channel estimation in a communication system.

12.   Any inquiry concerning this communication or earlier communications from the examiner should be directed to FRANK DONADO whose telephone number is (571) 270-5361.

The examiner can normally be reached on Monday-Thursday, 7:30 am -5 pm, alternate Fridays,

EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, Rafael Perez-Gutierrez can be reached on 571-272-7915. The fax phone number for

the organization where this application or proceeding is assigned is 571-270-5361.

Information regarding the status of an application may be obtained from the Patent

Application Information Retrieval (PAIR) system. Status information for published applications

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applications is available through Private PAIR only. For more information about the PAIR

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like assistance from a USPTO Customer Service Representative or access to the automated

information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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